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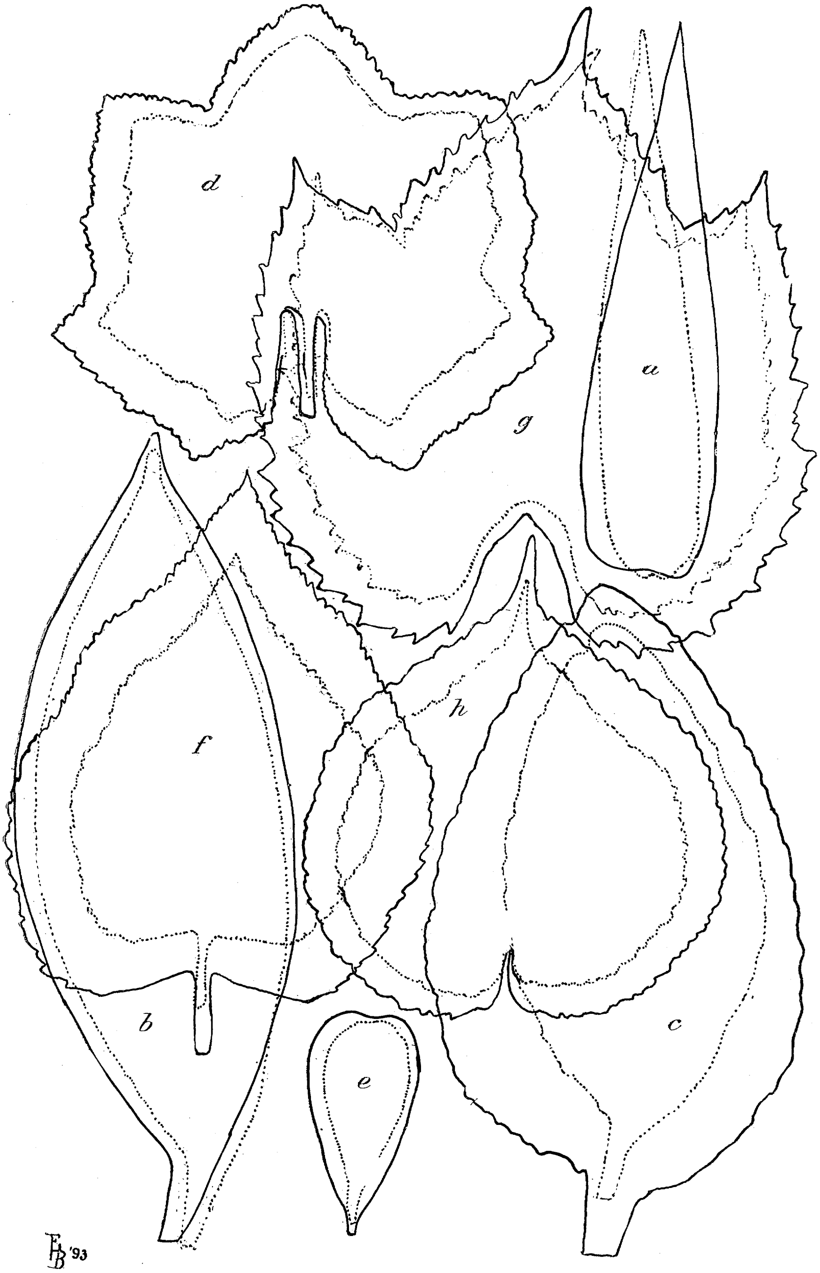

THE SHRINKAGE OF LEAVES IN DRYING.

Shrinkage of Leaves in Drying.*

(PLATE 184.)

While it is well known that foliage undergoes a shrinkage in the ordinary process of drying, the amount has not heretofore been considered great or perhaps worthy of mention. The Solandi process of sun printing previously considered (see page 485 of the BULLETIN Vol. 20), permits of an accurate and rapid recording of the shrinkage of foliage, and by means of it the accompanying outlines (Plate 184) are obtained and figures deduced below.

Fresh leaves were measured by securing sun prints as soon as convenient after being gathered. They were then put in press and dried in the ordinary way for making herbarium specimens. After they were fully dried, a second print was taken or the leaf itself used, and from these two measurements the comparisons are made. It is, of course, an easy matter to take a print each day up to the time the leaf is dry, and in that way determine when in the period of drying that the greater shrinkage takes place.

In order to determine what portion of the leaf surface underwent the more contraction, many of the samples of leaves were first brought with the surface upon a "card" used by hostlers in combing the manes of their animals. In this way small holes practically equidistant were made in the blade, and by means of these, the central ones being taken as fixed points, the shrinkage for all surrounding areas is determined.

The leaves of endogenous plants shrink less than those of the exogens and very little in length. Thus a leaf three inches long of a cultivated cypridpedium gathered in its full vigor loses but a small fraction of an inch in its length, and the same is true of fresh green leaves of a grass (*Panicum*) shown at *a*, while a five inch long leaf of lily-of-the-valley (*b*) shrunk largely in width, but almost none in length. But a somewhat similar leaf (*Helianthus*), as to shape and total area, shrank greatly in all directions and lost 27 per cent. of its original surface. The common plantain (*Plantago major*) bears a large leaf which exhibited a striking amount of shrinkage, as shown by the outlines of the fresh and dried leaf at *c*. The amount of loss in this instance was 44 per cent. At *d* is shown in its two dimensions a hollyhock leaf, this being of the palmate type. This leaf was while fresh punctured in a manner previously described, and the inner line shows how nearly equal the shrinkage was upon all sides. In the center of the lower portion of the plate is the outline of a fresh leaf of the purslane (*Portulacca oleracea*), and within it the same when dried. This is a leaf with very little framework.

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* Read before Section G., A. A. A. S., Madison, Wis., August, 1893.

A most striking example of shrinkage is seen in the outlines for a catalpa leaf shown at *f;* however, this leaf was gathered before it had reached its full size; its loss was 45 per cent. At *g* is shown a grape leaf, and one of an abutelon at *h*.

The following table gives the per cent. of shrinkage of several kinds of leaves examined:

ENDOGENS.	
Pontederia, . . .	11 per cent.
Lily-of-the-Valley,	14 " "
Orchid, ...	19 " "
Panic grass, . . .	27 " "
Average, ...	18 per cent.

EXOGENS.	
Hollyhock, ...	21 per cent.
Maple, ...	22 " "
Smartweed, ...	23 " "
Helianthus, . . .	27 " "
Purslane, ...	35 " "
Plantain, ...	44 " "
Catalpa, ...	45 " "
Average, ...	31 per cent.

The average for the two groups is almost exactly 25 per cent., or in other words a loss by shrinkage in the drying of foliage of one-fourth the original size.

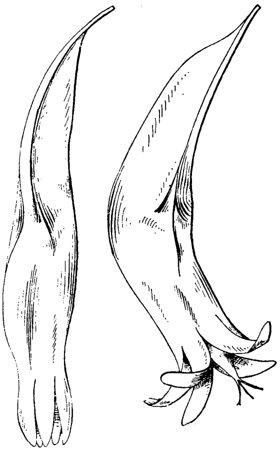
There are many reasons why types of plants should be seen by all monographers, but if types are so essential the writer, in view of the above facts, would plead for a sight of the fresh plants whenever possible. It is fortunate that descriptions are made in large part from dried specimens, or else the measurements for leaves, if at all precise (as usually they are not), would be uniformly too small for the green foliage.

A study of the outlines thus obtained leads to the conclusion that the greater shrinkage is in those localities containing the fewest veins and ribs. It is possible that there is a law of shrinkage to be expressed in the following terms: Leaves in drying under uniform lateral pressure shrink in all parts around and toward the geographical center of the mass of tissue composing its framework. A more general and condensed form of this law is: Leaves in drying under pressure shrink towards the mass-center of the framework.

Byron D. Halsted.

Morphological Notes on the Genus Brunnichia.

The following lines are intended to correct several errors recorded in the works of our leading authorities on genera. Being engaged in a study of some of the Polygonaceæ, the mistakes cited below attracted my attention. They seem to have been made by Endlicher in his Genera Plantarum and are apparently being perpetuated by later writers.



1. *The Calyx of Brunnichia.* Endlicher (Genera Plantarum, 310) says in regard to this: "Perigonium . . . . quinquepartitum, laciniis oblongis . . . . apice conniventibus." According to Bentham and Hooker (Genera Plantarum 3: 103) we should find "Perianthium 5-fidum . . . . lobis conniventibus," while Baillon records this: "Sepala 5, 6, oblonga . . . . circa fructum conniventibus." (Hist. Pl. 11: 393). All these descriptions are given in the place of Bank's original. "Calyx . . . . revolutis." (Gærtn. Fr. et Sem. 1: 214) or some corresponding phrase, which is the correct interpretation of the fact. The figure on Gaertner's table 45 is also correct.

In all probability the error arose by these authors taking their diagnoses from dried or dead specimens. In the living plant the segments of the calyx are revolute or reflexed, and it is only when they die or are dried that the segments converge. However, if soaked in water the calyx-lobes will take their natural position. This I have verified by all the specimens at hand.